Father Fenyi gives also a very exhaustive table, or rather diagram, of all the minor disturbances at this time, showing how they were situated with respect to the axis of the sun at the time of the eclipse.

THE OBSERVATORY OF YALE UNIVERSITY.—Dr. Elkin reports as follows to the Board of Managers of the Observatory of Yale University:—"The work with the heliometer has been carried forward during the past year in the directions outlined in my last report. We have examined so far fifty-one stars of large proper motion making in general three sets of measures at each parallax maximum. We have not, however, been able to keep the reductions quite up to date, so that I cannot at this moment give any definite results of our search for large parallaxes. I have also continued the series of parallax measures on the first magnitude stars—Aldebaran, Procyon, Regulus, Arcturus, and Vega having been followed up this year. Dr. Chase has continued the work on Algol, and has commenced a series on β Cygni to test the large parallax deduced by Mr. Jacoby from the Rutherfurd photographic plates. He has also been engaged upon and nearly completed the reduction of his measurements in Coma Berenices. Miss Palmer has been mainly occupied with the computations of our series on Jupiter's satellites, a work of considerable extent." The record is one which Dr. Elkin must regard with the satisfaction that comes to all who make a good use of time.

ASTRONOMISCHEN GESELLSCHAFT.—The following are the articles contributed to the first and second parts of the *Vierteljahrschrift der Astronomischen Gesellschaft* for 1893:—H. Gyldén, "Untersuchungen über die Convergenz der Reihen welche zur Darstellung der Co-ordinaten der Planeten angewendet werden," and "Nouvelles recherches sur les séries employé dans les Théories des planètes;" E. Anding, Lambert's Photometrie, "Photometria sive de mensura et gradibus luminis, colorum et umbræ; Robert Grant, Second Glasgow Catalogue of 2156 Stars for the Epoch 1890; J. G. Porter, a Catalogue of 1340 Proper Motion Stars; and Charles Pritchard, Researches in Stellar Parallax by the Aid of Photography. There is a list also of all the planet discoveries and comet appearances of the year 1892.

GEOGRAPHICAL NOTES.

DR. H. R. MILL has recently made a systematic bathymetrical survey of the larger lakes of Cumberland and Lancashire, the cost being defrayed by a grant from the council of the Royal Geographical Society. The soundings designed to delineate the general configuration of the various lake basins, were made at close intervals along a series of lines crossing the lake at right angles to its axis, and never more than half a mile apart. These tranverse sections were connected by oblique sections, along which the soundings were more widely spaced, and in addition longitudinal sections were made whenever it was practicable to do so. In Derwentwater the greatest depth found was 72 feet, but the surface of the lake was much below its usual level, being lower, probably, than has ever previously been recorded. Bassenthwaite Lake, though simpler in configuration, was found to have about the same maximum depth. Ullswater, the largest lake in England except Windermere, was found to have a depth of 208 feet, but it is quite possible that deeper soundings might be obtained. This lake was remarkably interesting on account of its division into a series of deep basins separated from each other by wide bars, from the most pronounced of which a rocky islet rises showing the characteristic marks of ice-erosion very clearly. Coniston Lake is simpler, being one practically straight deep trough, the deepest part of which is at least 184 feet below the surface. Wastwater was similar in configuration, though of much greater depth, an area one mile long and a quarter of a mile wide being deeper than 250 feet. The flatness of the floor of this depression may be judged by the fact that 258 feet was the greatest depth found in it. Samples of the deposit from different parts of each lake were secured, and will be examined by a specialist. Temperature observations were also made. It is probable that a similar survey of Windermere will be undertaken in the beginning of September.

MR. F. G. JACKSON sailed last week with a complete equipment for Nova Zembla, where he intends to spend next winter alone, exploring the island and thus gaining practical experience to aid him in his ultimate attempt to reach the North Pole by Franz Josef Land.

THE Paris Geographical Society promotes the study of geography amongst its members by conversational meetings for the discussion of various geographical problems. There are three groups of subjects: (1) mathematical and physical geography; (2) ethnography, anthropology, and the geographical distribution of plants and animals; and (3) historical and economic geography. Those willing to read papers or take part in the discussions at any group enter their names, and are notified of the meetings of their particular section by the general secretary. The importance of this method of promoting an active interest in geography is very considerable, and might well be introduced in this country, where the advantages of informal discussion are rarely recognised.

THE authorities of Owen's College, Manchester, have decided that Mr. Yule Oldham may continue his duties there concurrently with those of the lectureship of geography at Cambridge University to which he was recently appointed.

CELEBRATION OF THE ROTHAMSTED JUBILEE.

THE weather fortunately permitted the celebration on July 29 to take place, as originally intended, in the open air. The lawn in front of the laboratory was filled by the subscribers to the jubilee fund, while, on the common adjoining, a large crowd of spectators was assembled.

The memorial erected in front of the laboratory consists of a natural boulder of Shap granite, weighing nearly eight tons, standing on a rough granite base. On one side of the boulder a part of the surface has been dressed and polished, and bears the following inscription:—

To commemorate
the completion of
Fifty years
of continuous experiments
(the first of their kind)
in Agriculture
conducted at
Rothamsted
by
Sir John Bennet Lawes
and
Joseph Henry Gilbert
A.D. MDCCCXCIII.

The chair was taken by the Right Hon. Herbert Gardner, M.P., Minister of Agriculture, at 3 p.m.

The Secretary of the Jubilee Committee, Mr. Ernest Clarke, then read a list of names of persons who had sent letters or telegrams regretting their absence on the occasion. The list was a long one, and included H.R.H. the Prince of Wales, H.R.H. Prince Christian, the Marquis of Salisbury, Lord Kelvin, Mr. Chaplin, Sir G. Stokes, Prof. Huxley, L. Pasteur, P. Dehérain, E. Tisserand, E. Wolff, F. Nobbe, the Association of Agricultural Colleges and Experiment Stations in the United States, and many others.

The Chairman said they had met to do honour, as far as lay in their power, in the name of agriculture and of the agricultural classes, to two distinguished men, who had rendered invaluable services to our great national industry, and to dedicate that day an outward and enduring memorial of the admiration which the agricultural world felt for the work which they had accomplished. Nothing could be more appropriate for such a purpose than the massive granite boulder which they saw before them. It had already witnessed many of the experiments of nature; they hoped it might stand for many generations to come, as an outward and visible sign of the manner in which the life-long work of Lawes and Gilbert had been appreciated by the men of their time.

He believed, although Sir John Lawes commenced the work of his life as far back as about 1834, it was only in 1843 that the actual field experiments, on which our reliable records were founded, were begun, and in which he was joined by Dr. Gilbert, who had since been the partner of the labours of his life; they were, therefore, commemorating the jubilee of both gentlemen. It must be interesting to all at such a moment to recall the varied succession of agricultural prosperity and depression those two had seen during the past fifty years. During that period their friends had seen wheat rise as far as 78*s*. He thought that was in 1855; and, he regretted to say, since he had had the honour to be President of the Board of Agriculture, it had fallen as low as 24*s*. 8*d*. in May last, making a difference of 50*s*. per quarter. In a meeting like the present, so interested in agricultural subjects, he might say that he thought the development of steam ocean traffic had done more than Free Trade to bring down the price of wheat. There was one ray of hope—he admitted it was a very small one—with regard to the present low and phenomenal prices of wheat. There seemed little doubt, from a calculation he had made, that the extremely low prices were partly due to the extraordinary reserves of that article they had in the country since this 1891. The normal reserve of wheat in this country was calculated to be about 2,000,000 quarters, but since 1891 that reserve, following upon the scare of Russian famine, rose at a bound to over 6,000,000 quarters. At the present moment it had fallen again by something like 2,000,000, and as there was every reason to expect there would not be the same influx of wheat into our country in the present year as there had been in the past, it was possible, when the reserve reached the normal standard again that prices might recover.

A memorial more enduring than the granite boulder before them was furnished by the published records of the experiments. It would always be a pleasant recollection to him to know that since he had occupied his present position he had been able to place some fifty memorials of Sir John Lawes and Dr. Gilbert over the country amongst agricultural institutions—he alluded to copies of their works, which, with the sanction of the Treasury, he had been able to purchase at the public expense.

Mr. Gardner, in conclusion, said it was with the sincerest pleasure and profoundest respect he expressed to Sir John Lawes and Dr. Gilbert, in the names of the agriculturists of this country, their felicitations on their jubilee, and their hopes that they might long enjoy the honour and admiration of all classes of their fellow-countrymen.

The Duke of Westminster said he owed the agreeable position he occupied on that occasion to the fact that he was the ex-President of the Royal Agricultural Society of England, and that during his year of office he had been chosen President of the Rothamsted Jubilee Fund. He had the pleasure of asking Sir John Lawes to accept his own portrait, painted by Mr. Herkomer, and he hoped Lady Lawes, their children, and grandchildren would consider it worthy alike of the subject which it represented and of the old walls which it was destined to adorn. He had further to present both to Sir John and to Dr. Gilbert an illuminated address, signed on behalf of the subscribers by the Prince of Wales, and couched in the following terms.—

"TO SIR JOHN BENNET LAWES, BART., D.C.L., LL.D., F.R.S., &c.

"On behalf of the Committee of the Rothamsted Jubilee Fund and of the numerous subscribers to that fund in all parts of the world, I offer you the most hearty congratulations on the completion of half a century's uninterrupted investigation of agricultural problems of the highest practical value and interest."

"These investigations, which originated with you, relate not only to the growth of cereal and other crops under the most varying conditions, but also to the economic effect of different foods on the development of the animals of the farm. They have embraced, moreover, most important researches concerning the chemical constituents of soils, the rainfall, drainage waters, and the sources from which plants derive their supply of nitrogen."

"During the whole of this period of fifty years you have had the zealous co-operation of your lifelong friend Dr. Joseph Henry Gilbert, whose name will ever be associated with yours, and whom jointly with you we desire on the present occasion to congratulate."

"For the continuance of the experiments and investigations which have already extended over so long a period, you have munificently provided by the establishment of the Lawes Agricultural Trust, so that our successors will profit even more, if possible, than we of the present day have done by your enlightened labours."

"The Memorial which is now erected will, it is hoped, preserve your joint names in honoured remembrance for centuries to come, while the portrait that is presented to you herewith will hand down to future generations the likeness of one of the most disinterested as well as the most scientific of our public benefactors." "ALBERT EDWARD P."

"July 29, 1893."

"TO JOSEPH HENRY GILBERT, M.A., PH.D., LL.D., F.R.S., &c.

"In celebrating the Jubilee of the Rothamsted Agricultural Experiments, it is impossible to dissociate your name from that of Sir John Lawes, and on behalf of the subscribers to the Rothamsted Jubilee Fund in all parts of the world I offer you the most hearty congratulations on the completion of your fifty years of continuous labours in the cause of agricultural science."

"The nature and importance of those labours are so well known that it is needless to dilate upon them; but if the institution of the various investigations and experiments carried out at Rothamsted has been due to Sir John Lawes, their ultimate success has been in a great measure secured by your scientific skill and unremitting industry. Moreover, by your lectures and writings, you have been a leading exponent in this and other countries of the theoretical and practical aspects of the researches that have been undertaken at Rothamsted."

"A collaboration such as yours with Sir John Lawes, already extending over a period of upwards of fifty years, is unexampled in the annals of science. I venture to hope for an extended prolongation of these joint labours, and trust that the names of Lawes and Gilbert, which for so many years have been almost inseparable, may survive in happy conjunction for centuries to come."

"July 29, 1893." "ALBERT EDWARD P."

Continuing, the Duke said it was also his pleasing duty to ask Dr. Gilbert to accept, on behalf of the subscribers, the handsome silver plate which was before them, and which bore the inscription—"Presented by the subscribers to the Rothamsted Jubilee Fund to Dr. Joseph Henry Gilbert, F.R.S., in commemoration of the completion of 50 years of unremitting labour in the cause of agricultural science, 29 July, 1893."

M. Johannet then read an address from the Société des Agriculteurs de France, and M. Aubin, from the same Institution, followed with a congratulatory speech delivered in French.

The Duke of Devonshire, President of the Royal Agricultural Society, said they had not come there to make speeches, but to do honour to the benefactors of their country. He appeared that afternoon, in the name of the 11,000 members of their great Society, to present to Messrs. Lawes and Gilbert the illuminated addresses which were upon the table, and to offer them their most hearty congratulations on the completion of half a century's investigations at Rothamsted. The Rothamsted experiments were a model of what all experimental inquiries ought to be; they had stimulated the carrying out on a lesser scale of other experiments, as those at Woburn and those of numerous local societies. "Practice with Science" was the motto of their Society; it might well be applied to Rothamsted work, which had shed light on many of the vexed questions of practical agriculture. For forty-five years the Society had had the advantage of the personal advice and assistance of Sir John Lawes as a member of its council, and it was proud to recognise in Dr. Gilbert one of the most distinguished of its honorary members. Their contributions to the Society's *Journal* from 1847 to the present time constituted the most valuable series of papers which had appeared in its pages, and they alone would have made the *Journal* famous. For this and all the Society offered to Sir John Lawes and Dr. Gilbert their hearty thanks, hoping that they might long be spared to continue their labours, which, in the words of the Society's charter, were for "the general advancement of agriculture."

Prof. Michael Foster, as senior secretary of the Royal Society, presented two addresses from the Society, and with their hearty congratulations, expressed the hope that the Rothamsted Station might be as fruitful of scientific results in the future as in the past.

Dr. H. E. Armstrong, the President of the Chemical Society, presented an address from that body. He remarked that Rothamsted work was appreciated by none more than by the Fellows of the Chemical Society.

Prof. Stewart, the President of the Linnean Society, presented an address on behalf of the Society. They regarded the Rothamsted experiments as the highest contribution that had ever been made to the science of agriculture.

Prof. E. Kinch presented an address from the Royal Agricultural College, Cirencester. He alluded to the great educational value of the Rothamsted experiments, to the kind reception of the students at their annual visit to the Station, and to the debt of gratitude they owed to Dr. Gilbert for his services as honorary professor at the College.

Mr. Ernest Clarke, in the absence of M. Tisserand, then read an address from the Société National d'Agriculture de France. Mr. Clarke mentioned that several other addresses were on their way to this country.

Sir John Lawes, who, on rising to reply, was received with hearty cheering, said that it was only a very few months since he and his wife received the congratulations of many friends on having attained fifty years of married life, which was occasionally called a golden wedding. That afternoon he had to return thanks to that distinguished company for congratulating himself and Dr. Gilbert on the work they had carried on together for fifty years. When two persons were joined together in marriage they could not part—they were bound together by a solemn tie. Dr. Gilbert and himself were bound by no ties. During the whole of the fifty years Dr. Gilbert had been perfectly at liberty to leave him, and he to leave Dr. Gilbert; they had remained together from their mutual love of the work they had undertaken. He had given to this work all the time that he could spare consistently with other duties; but Dr. Gilbert had given his whole time to it, and had it not been for the labours of Dr. Gilbert, the affairs of Rothamsted would have been in a different state to that in which they now were. Dr. Gilbert had given his life to the experiments—had given the most arduous part of his life—had given his holidays, and this very year he was going to Chicago to deliver a course of lectures on the work at Rothamsted.

He had now had sixty years' experience of agriculture. When he began farming in 1834 the country was suffering from agricultural depression, the crops were so large that they more than supplied the wants of the nation; now our wheat crop only sufficed for one-third of our consumption, and the rest had to be furnished by other countries. He was afraid that their investigations had been of more use to the foreigner than to the English farmer, for the latter had always grown good crops, and thus could not meet lower prices by an increased production, while the foreigner had been able to do this.

Sir John Lawes expressed his cordial thanks for the various presentations made to him that day, and especially for the granite boulder, which he playfully said would probably still be in existence when the portrait had been transferred from the drawing-room to the bedroom, and from the bedroom to the garret, and people had forgotten whom it represented, and who painted it.

Dr. Gilbert expressed himself as unable to return thanks adequately for the ovation of that day. Referring to the early years of their investigations, he said that they commenced with orthodox views; but that, as they could not alter the laws of nature, they presently found that they were at variance with received opinion, and their scientific friends looked on them with pity. Their first paper was subjected to merciless excision by the editor of the journal to which it was sent, and they with difficulty secured its publication. Those who opposed became, however, finally their firm friends, and they had since published in that very journal papers occupying about 2,000 pages. The reason they had been able to steer clear of error in their numerous experimental inquiries at Rothamsted was that they had adhered resolutely to the motto of the Royal Agricultural Society, and had associated practice with science throughout the whole course of their researches. Agriculture, more perhaps than any other art or industry, was dependent upon the intelligent application not of one but of many branches of science, and hence it was that the experimental agriculturist found himself in contact at one time with the botanist, at another time with the physiologist, and again with the chemist and the geologist, the statistician and the economist. He mentioned that he had in preparation a jubilee edition of the memorandum sheet on the Rothamsted experiments, and concluded by expressing his warmest thanks for the sympathetic kindness which his friends had shown him that day.

Sir Joseph Hooker, in proposing a vote of thanks to the executive committee of the Jubilee Fund, said that he had never seen chemistry and botany united to such good purpose as in the investigations of Lawes and Gilbert.

Sir John Evans, treasurer of the fund, in responding, said that the boulder of Shap granite which they saw before them weighed nearly eight tons, and had twice broken down on its way to Harpenden. He need hardly say that a considerable weight had been taken off his mind when he at last had the satisfaction of seeing the huge monolith firmly planted in the place it now occupied.

The Earl of Clarendon proposed a hearty vote of thanks to the Chairman, which was carried by acclamation, and the formal proceedings terminated.

The portrait of Sir John Lawes, by Hubert Herkomer, R.A., was afterwards on view in the laboratory.

A garden party at Rothamsted was held later in the afternoon, which was attended by most of the visitors.

THE GEOLOGISTS' ASSOCIATION IN IRELAND.

THE visit of the Geologists' Association to the counties of Dublin and Wicklow, under the direction of Profs. Sollas and Cole, extended officially from July 24 to July 29; but a number of members arrived in Dublin for Sunday, July 23, and visited the cathedrals and places of historic interest in the city, under the guidance of Rev. Denis Murphy, S.J. On Monday the full party examined the grits and *Oldhamia*-slates of Bray Head. The Rev. Dr. Haughton, F.R.S., delivered a speech of welcome, standing on the rocks of the headland, and Prof. O'Reilly and Prof. Sollas, F.R.S., explained the structure of the mass, showing how the more resisting grits have caused a wrinkled flow of the shales and slates between them. The excursion was continued to the fine intrusive junction of the Leinster granite and the Ordovician rocks at Killiney, the latter being metamorphosed into mica-schists with abundant andalusites and some garnets.

On Tuesday, July 25, the promontory of Portrane was visited, under the direction of Prof. Grenville Cole. The basal carboniferous conglomerates ("Old Red Sandstone") were seen above the Bala series, which is here finely fossiliferous. The igneous rocks, ashes, agglomerates, and some lavas, associated with the great volcano of Lambay, are well seen upon this coast, and a true conglomerate of volcanic blocks and of pebbles, worn from the contemporaneous coral-reefs is one of the most interesting exposures. The brecciation, under pressure, of the alternating layers of shale and limestone produces, near the Priest's Cave, a rock resembling a coarse conglomerate of limestone-pebbles in a matrix of black clay.

On Wednesday, Howth was visited; Prof. Sollas conducted the party, and Dr. V. Ball, Mr. G. H. Kinahan, and Mr. A. B. Wynne were also present. The glacial drift on striated surfaces of Carboniferous Limestone, the dolomitisation of the limestone, the Ordovician dykes of diabase in the quartzites, and the quartzites, grits, and many-coloured shales, of the Howth and Bray series, were studied along the southern shore. Casts of worm-burrows were pointed out in some of the sandstones near the Needles.

On Thursday, July 27, an early start was made for Rathdrum, and cars were taken to Glendalough and the Seven Churches. Prof. Sollas and Prof. Cole led the party to the high ridge above the upper lake to examine the amphibolite in the Ordovician slates. Prof. Sollas showed how the slates had been converted into schists by contact with the Leinster granite, and how pressure has produced a foliated structure even in the intrusive mass; but the amphibolite has converted the schists locally into a "Desmosite," consisting of quartz, garnet, and dark mica, the latter lying in planes across those of the first foliation.

On Friday the Rev. Maxwell Close acted as guide to the shell-bearing sands and gravels, 1,000 feet up on the slope of Two-rock Mountain, near the house called Ballyedmondduff. Small fragments of marine shells were freely found in the upper pit. The party then descended into Glencullen, where Prof. Cole pointed out how the valley had been at one time choked with "drift," full of striated blocks of limestone and *débris* of granite and Ordovician rocks, and how the river has now cut down into this mass, as is the case in so many valleys of the southern and eastern Alps. From Enniskerry the geologists drove through the Scalp, a bold notch in the granite ridge, with an exposure of the junction with contorted Ordovician rocks.